

N47408-00-D-8118
ENERGY AND UTILITIES
ENGINEERING AND TECHNICAL SERVICES
STATEMENT OF WORK

1.0 INTRODUCTION

The Naval Facilities Engineering Service Center (NFESC) provides specialized engineering, scientific, and technical products and services to accomplish tasks and functions assigned by the Naval Facilities Engineering Command (NAVFAC) and by other Navy, Marine Corps, DoD, and Federal customers. The personnel of NFESC's Energy & Utilities Department are the Navy's experts in energy and utilities systems, plants, and equipment ashore. The Department provides engineering, technical, and project management products, services, and support to its customers, and is responsible for management and execution of the Department of the Navy (DoN) Shore Facilities Energy Program. The purpose of this contract is to extend the Department's capability to provide mission related products and services that would otherwise be constrained due to staffing and workload limitations.

2.0 SCOPE

The contractor shall provide engineering, technical, project monitoring & control, minor construction, equipment procurement, and installation services in the following areas:

Plant, systems, and equipment design, installation, operation, maintenance, overhaul, repair, and troubleshooting:

- ?? Heating, Ventilating, and Air Conditioning (HVAC) systems
- ?? Direct Digital Controls (DDC) – facilities management systems
- ?? Supervisory Control and Data Acquisition (SCADA) systems
- ?? Electrical and communications systems engineering and technical services
 - ?? Electrical power distribution system condition, integrity, and operability assessment
 - ?? Power quality studies and analyses
 - ?? High voltage center of expertise
 - ?? Radio frequency interference analysis and troubleshooting
 - ?? Low frequency (LF) and very low frequency (VLF) communications services
- ?? Thermal plant design, installation, operation, maintenance, overhaul, repair, and troubleshooting
- ?? Heating plant centralization/de-centralization studies
- ?? Reciprocating engines, systems, and plant design, installation, operation, maintenance, overhaul, repair, and troubleshooting – both mechanical drive and power generation applications
- ?? Combustion turbines, systems, and plant design, installation, operation, maintenance, overhaul, repair, and troubleshooting – both mechanical drive and power generation applications
- ?? Utility and power plant, systems, and equipment condition assessment, predictive/preventive maintenance studies, and consulting
- ?? Machinery condition monitoring and analysis – vibration, thermography, etc.
- ?? Utilities distribution systems and pipeline engineering and technical services – including:

- ?? On-site evaluations to determine system condition, integrity, and operability
- ?? Development and implementation of technical solutions, including repair, refurbishment, and recertification
- ?? Metering studies and plans
- ?? Leak detection, location and repair – to include using ultrasonic equipment, correlators, and Sulfur Hexafluoride sniffing
- ?? Utilities systems include steam, high temperature hot water (HTHW), hydraulic and thermal fluids, POL (petroleum, oils, and lubricants), compressed air, other compressed gasses, industrial water, potable water, etc.
- ?? Management and execution of the DoN Shore Facilities Energy Program – including DELETED Energy Awareness, awards (DELETED BY SOL.AM. 0003), criteria, data, web page design, showcases, and program management assistance including meeting facilitation and reporting. (Note: the preceding is a correction of the prior incorrect complete deletion of services for the DoN Shore Facilities Energy program, as of Sol. Amend. 0002)
- ?? Comprehensive energy and water studies, surveys, and audits to identify conservation opportunities and develop projects
- ?? Investigation of new and underutilized energy efficient technologies to assess economic and environmental impacts, and to demonstrate beneficial applications at Navy and Marine Corps installations.

3.0 REQUIREMENTS

Specific detailed requirements shall be specified in individual Delivery Orders. The contractor shall provide engineering, technical, project monitoring & control, equipment procurement and installation services and support, including all labor, supervision, materials, facilities, equipment, and quality assurance services and support, necessary to accomplish the specified work in the prescribed timeframe.

3.1 Project development, monitoring, control, and execution products and services shall include:

- ?? Perform engineering and technical investigations and studies, make recommendations, and provide related services
- ?? Provide on-site overhaul, repair and replacement of existing equipment
- ?? Provide support to the Navy Energy Program as detailed herein
- ?? Perform economic and engineering/technical viability studies and analyses
- ?? Perform studies to assess the environmental impacts of energy and utilities projects
- ?? Develop SOWs, specifications, data requirements, etc.
- ?? Develop/prepare engineering drawings through both computer aided and manual methods
- ?? Develop designs, perform design reviews
- ?? Review design, construction, operation, maintenance, and training plans and submittals
- ?? Perform construction monitoring, inspection, and on-site quality assurance (QA)

- ?? Perform plant, system, and equipment start-up, testing, commissioning, and troubleshooting
- ?? Provide technical training

3.2 Energy and utilities engineering, technical, equipment procurement, construction, and installation products and services.

Types of work shall include:

- ?? Construction, Installation, and Testing (Design-Build)
- ?? Perform or provide oversight over the design, procurement, installation, testing and evaluation, , modernization, overhaul, repair, modification, refurbishment, and demolition of utility plants, systems, and equipment, including but not limited to those listed in the section entitled "Types of systems and equipment...."
- ?? Perform or provide oversight over equipment, system, plant, and facility construction, inspection, quality assurance, start-up, commissioning, and acceptance testing.
- ?? Engineering Services & Studies:
- ?? Conduct engineering and technical studies, technology and product evaluations, evaluations of programs.
- ?? Conduct problem solving meetings, conferences, and similar sessions – to include developing agenda, facilitating meetings, and documenting results
- ?? Provide feasibility, equipment selection, and life assessment engineering studies that include all listed plants, systems, and equipment.
- ?? Perform concept design, DD Form 1391 preparation, systems design, Title II QA/QC services, and system commissioning and validation.
- ?? Provide engineering drawing services – develop/prepare, scan, and edit architectural and engineering drawings using both computer assisted (CAD) and manual drafting methods.
- ?? Conduct comprehensive base-wide energy audits, energy management, and metering studies.
- ?? Provide Y2K contingency planning support and implementation of field fixes – including but not be limited to fixing hardware or systems that are dysfunctional or determining if they are Y2K compliant.
- ?? Engineering services and studies may include, but are not limited to:
- ?? Building heating and cooling load calculations
- ?? Air duct system sizing calculations
- ?? Piping system pressure drop calculations
- ?? DDC/EMCS system design
- ?? Structural analysis of buildings and components
- ?? Pressure vessel design
- ?? Construction cost estimates
- ?? Energy savings calculations
- ?? Life cycle cost analyses
- ?? Construction and installation specifications

- ?? Environmental impact assessments and reports
- ?? Energy and water surveys/audits and feasibility studies – both comprehensive and focused (e.g., lighting, motors, HVAC, industrial processes, ...)
- ?? Engineering and technical studies, technology and product evaluations, evaluations of programs
- ?? Engineering and technical problem investigations and recommendations
- ?? State of the art reports (e.g., the current and immediate future of the UMCS industry - type of field equipment, master station, etc.)
- ?? POL facility integrity assessments
- ?? Hydrostatic pressure testing of piping systems and pipelines
- ?? Pipeline “pigging” inspection
- ?? Potable water system leak detection
- ?? Sulfur Hexafluoride leak detection
- ?? Business Case Studies – in depth analysis of proposals from utilities privatization contractors, to include a detailed report with recommendations as to viability of proposals or offers.
- ?? Electrical work:
- ?? Electricity metering on low, medium and high voltage systems
- ?? Power quality investigations and troubleshooting
- ?? Power line fault locating service
- ?? Electrical systems analysis – overhead and underground electrical distribution. Measure parameters to document load profiles and identify power flows to individual circuits, feeders, and loads.
- ?? Electrical disturbances – high and low voltage electrical distribution. Troubleshoot and identify causes of power quality problems. Procure, test, and install equipment to resolve electrical problems such as faults, surges, and harmonics.

Types of plants, systems, and equipment shall include:

- ?? Engine and Turbine Plants, Equipment, and Controls
- ?? Complete reciprocating internal combustion engine plants, including engine assemblies with all associated equipment, systems, and controls for either mechanical drive or power generation applications.
- ?? Complete gas turbine plants, including turbine engine assemblies with all associated equipment, systems, and controls for either mechanical drive or power generation applications.
- ?? Complete steam turbine plants, including turbine assemblies with all associated equipment, systems, and controls for either mechanical drive or power generation applications.
- ?? Thermal Plants, Equipment, and Controls
- ?? Steam generators and boilers, and high temperature hot water (HTHW) generators and boilers and all associated equipment, systems, and controls.
- ?? Pipelines and Piping Systems, Equipment, and Controls

- ?? Utility distribution pipelines and plant piping systems, including steam, high temperature hot water (HTHW), hydraulic and thermal fluids, POL (petroleum, oils and lubricants), compressed air and other compressed gasses, industrial water, potable water, etc. .
- ?? Electrical Systems, Equipment, and Controls
- ?? Electrical transmission and distribution equipment, cable, insulators, corona rings, etc.
- ?? Overhead and underground medium, and high voltage electrical distribution systems.
- ?? Substation equipment, including switchgear and transformers.
- ?? Electrical Supervisory Control and Data Acquisition (SCADA) systems and equipment.
- ?? Electrical metering for low, medium, and high voltage systems.
- ?? Un-interruptible power supply systems.
- ?? Facility interior and exterior lighting and wiring.
- ?? HVAC Systems, Equipment, and Controls
- ?? All HVAC equipment, sensors, and controls.
- ?? All HVAC equipment, air-cooled, water-cooled, hydronic and air handling equipment.
- ?? Utilities Monitoring and Control Systems and Equipment
- ?? Base-wide control systems and equipment, including building control systems and equipment (e.g., UMCS, EMCS, BCS, EMS, and DDC.)
- ?? Electrical Supervisory Control and Data Acquisition (SCADA) systems.
- ?? Water/waste water Supervisory Control and Data Acquisition (SCADA) systems.
- ?? Software support where the computer work is not the main focus of the work.
- ?? Energy Efficient Equipment, Products, and Technologies – including, but not limited to lighting systems, occupancy sensors, motors, variable speed drives, controls, renewable energy (photovoltaic, solar hot water, wind), solid state frequency converters, natural gas engine driven heat pumps and chillers, direct-fired absorption chillers, fuel cells, desiccant dehumidification systems, geothermal / ground source heat pumps, solar walls, timeclocks and energy saving controllers, infrared heating systems, thermal systems, compressed air systems, and building envelope systems (windows, insulation, infiltration, construction methods), etc.

3.3 Navy Energy Program support products and services shall include:

- ?? Develop facility and utility energy projects employing the latest energy efficient technologies, perform economic and technical viability studies and analyses, verify savings on completed energy conservation projects, develop energy program criteria, revise construction specifications and criteria to include energy conservation standards and procedures, and perform energy surveys, engineering studies, and other energy program engineering support.
- ?? DELETED: Provide SECNAV Energy Awards Program services – to include develop awards packages, evaluate and rank candidates, develop ceremonial

- presentations, arrange meeting and travel logistics, arrange for, facilitate, and videotape ceremonies, etc. (DELETED by Sol.Amend. 0002)
- ?? DELETED: Provide Energy Awareness Program services – to include broad dissemination of energy awareness information to civilian employees, military members, and their families, as well as focused dissemination of information to key managers and decision makers, such as energy managers, public works officers, facilities maintenance officers, commanding officers, etc. Methods include design/development/preparation of informational materials and their delivery through media such as displays, news releases, articles, newsletters, trade journals, technical data sheets, brochures, displays, videos, Internet e-mail and web pages, fax services, technical data briefings, and promotional materials such as posters, stickers, thermometers, etc. (DELETED by Sol. Amend. 0002)
 - ?? Multi-media Presentations – Develop format and content for training and informational presentations, prepare CD-based media for use or distribution by personnel possessing minimal computer skills. Includes capabilities in graphic arts and computer-based publishing.
 - ?? Technology demonstration projects – to include, system/facility design and procurement & installation of hardware (i.e., design-build), system commissioning, acceptance testing, developing O&M programs, guides & manuals, follow-on system performance monitoring and reporting.
 - ?? Software services where the computer work is not the main focus of the work, e.g., developing a web page as part of a broader task to provide energy or utilities engineering services.
 - ?? Perform energy and water conservation surveys and audits, including usage models, and project development
 - ?? Prepare data packages for ESPC contracts
 - ?? Update, maintain, and distribute mailing lists of DON and DOD energy contacts.

3.3.1 Facility and Utility Energy Conservation Projects

An energy conservation project is defined as any construction or modification to existing facilities which will save on utility costs. Typically, acceptable projects will have a payback of ten years or less and a savings to investment ratio of 2.0 or more. Types of projects include heating, ventilation, air conditioning systems and controls, direct digital controls, steam and condensate systems, boiler plant modifications, weatherization (improving the thermal envelope of a building), lighting systems, energy recovery systems, electrical energy systems (increasing the energy efficiency of an electrical device or system or reducing cost by reducing peak demands), and renewable energy systems. Energy conservation projects are categorized according to cost; the Federal Energy Management Program (FEMP) funds projects costing between \$50,000 to \$300,000 and the Energy Conservation Investment Program (ECIP) funds projects costing more the \$300,000. Several projects may be identified at a single installation. Site visits will be required for project development.

3.3.2 Energy Conservation Project Savings

The energy conservation projects identified in Paragraph 3.3.1 are approved and funded based on initial projected savings. These savings are reported in terms of BTUs, annual dollar savings, number of years to pay back the initial costs, and savings to investment ratios. The contractor shall perform audits of completed

projects to determine the actual energy and dollar savings and how these savings compare with those initially projected. The contractor shall gather all data necessary and document all calculations and conclusions. The contractor shall make recommendations on how to make existing and future projects more effective.

DELETED BY SOL. AMEND. 0002: 3.3.3 Energy Program Awareness Materials

Navy energy program awareness is developed and distributed through instructions, manuals, video tapes, newsletters, displays, media publications, Internet and e-mail, fax services, technical data reports and briefings, tips for energy managers, and promotional materials such as posters, stickers (placed on light switches), and thermometers. Promotional materials must be eye-catching, have a theme and message conveyed in such a manner as to change personnel behavior. A partial list of some energy programs the contractor may work on include:

Steam Traps	Energy directives	
DDC	Economic Analysis	Alternatively Fueled Vehicles
DUERS	PRESS	Navy Energy Organization
EAR	Lighting Systems	Load-Shedding Program
ECIP	DSM	Building Energy Monitors
EMCS	Training	Appliance Energy Use
Energy	Cogeneration	Computerized Utility Billing
Awards		
Energy	HVAC Controls	Utility/Building Modeling
Surveys		Software
Life Cycle	Energy Baselines	Cold Iron Support
Costs		
Maintenance		Window vs. Central A/C Units
Metering	Variable Speed Drives	Low/No Cost Projects
Motors	Environmental	Power Plant Modifications
	Impact	
MUSE	Energy Awareness	Energy Manager's Handbook
	Week	
Peak Shaving	Shared Energy	Fuel Types & Btu Ratings
	Savings	
Power Factor	Energy Reduction	DOD Energy 2000 Program
	Goals	
SCADA	Water Savings	400 Hz Generators/Converters
	Projects	
UCAR	Energy Policy Act	Installation Energy
		Management Plan
Weatherization	Renewable Energy	Boiler Plant Modifications

Tasking under this line item may include engineering services and evaluation of the above programs. Update methodologies, tables, graphs, text, and figures in instructions and documents to ensure the

most cost-effective life cycle investment in the energy program. (DELETED BY SOL. AMEND. 0002)

3.3.4 Standard Documentation

The contractor shall review, evaluate, and prepare and/or revise Department of Defense (DoD) standardization documentation to reflect current energy conservation technology and policy. The contractor shall coordinate document criteria with industry, NAVFAC Headquarters, NAVFAC Engineering Field Divisions, the Army Corps of Engineers, and the Air Force for comment, resolution, and proper categorization. Documentation may include federal and military specifications and standards, design manuals, military handbooks, definitive and standard drawings, guide specifications, and other technical publications such as technical data sheets, building/systems commissioning guides, operating manuals, maintenance manuals, bulletins, drawings, and illustrations. The contractor shall accomplish engineering, data collection, analytical, and other technical services as required in support of the NAVFAC Engineering and Design Criteria Program and the Federal Construction Guide Specification Program. Energy efficient lighting, ballasts, motors, variable speed drives, and building insulation are examples where current specifications require revision.

3.3.5 Energy Surveys

Energy surveys and audits are conducted at Navy and Marine Corps installations to establish energy use, patterns of use, and load profiles. Data is gathered on the amount and cost of utilities (such as electricity, gas, fuel, oil, water, and steam). Energy consumption is then determined for lighting, heating, air conditioning, processing, etc. The energy survey must accurately identify and develop cost effective energy conservation projects as described in paragraph 3.3.1. Types of surveys range from walk-through, where visual inspection of an installation's facilities is made to determine maintenance and operation energy conservation opportunities, to full scale audits requiring metering to determine energy used for a particular function, and modeling of facilities for identifying energy use patterns on a year-round basis.

3.3.6 Engineering Studies and Program Support

Additional engineering and program support to be provided by the contractor includes:

- ?? Develop equipment, techniques, and procedures for the generation, storage, distribution, utilization, monitoring, control, and conservation of electrical power and energy required by Navy shore stations and ships receiving "cold-iron" support from the stations.
- ?? Required systems and equipment can generally be classified as electromechanical, and may involve electrical, electronic, mechanical, and fluid processes and interfaces.
- ?? Emphasis is placed upon design, fabrication of prototypes, installation, and test, to include the development and use of new utility and industrial technology and advanced methods for system/equipment diagnostics and maintenance, fiber optics, facility mapping, and computer-aided design and graphics.
- ?? Engineering services for developing guidance and installing applications in lighting, motors, variable speed drives, peak power generation, HVAC, direct digital controls, heat pumps, renewable energy (such as solar) technology, smart windows, wind power, load shedding, energy storage, and room sensor technology.

- ?? Develop, produce, and distribute reports, including color graphics. The contractor shall follow the guidelines contained in the Publication Standards for Maintenance and Operations Manuals dated March, 1991. The contractor shall also submit deliverables in Microsoft Word.
- ?? Review and evaluate NAVFAC record drawings in accordance with guidelines provided by individual delivery orders. Effort will include microfilming, packaging, and shipment of all reviewed drawings and properly documenting the status/disposition of the drawings.
- ?? Conduct design reviews, data package evaluations, feasibility studies, systems analyses, data reviews, and engineering analyses relative to facilities, facility equipment, and components.
- ?? Provide support services for a wide variety of programs, to include Utilities Privatization. Services shall include (1) meeting and conference support, such as providing facilitation services; developing and distributing agenda, read-ahead packages, presentations, and slides; providing meeting/conference facilities and equipment (e.g., conference rooms, computer support, presentation & slide projection equipment, etc.); preparing and distributing minutes and reports; and (2) developing and maintaining privatization program databases and the program website (not just programming, but developing the content).

4.0 SPECIAL CONSIDERATIONS

Travel will be required to various government installations, academic institutions, and contractor facilities, worldwide. Travel will be authorized by the individual delivery orders.

Secret level security clearances are occasionally required for working in some facilities at military installations. The contractor shall provide personnel who meet security requirements as needed.

5.0 EXPERIENCE AND QUALIFICATIONS

Experience and qualifications of contractors, subcontractors, and personnel must be relevant. To be considered relevant, experience and qualifications must be pertinent to the type of work being contracted for under a particular delivery order, and must be pertinent to plants/systems/equipment similar in type, size, and capacity to the plants, systems, and/or equipment being contracted for under the particular delivery order.

For example, contractors, subcontractors, and key personnel for comprehensive HVAC projects should be experienced in evaluating, designing, and installing HVAC systems, including air handler units, chillers, desiccant dehumidification systems, as applicable; experienced at performing pre- and post-installation monitoring, to include, electric and natural gas usage, system performance, conditioned space temperature and humidity; have thorough knowledge of HVAC control systems including, pneumatic and direct digital controls as applicable; experienced in evaluating HVAC systems for energy savings strategies; structural engineering experience as needed to evaluate support requirements (e.g., roofs and mechanical rooms) for loading due to modifications to buildings, etc.

5.1 Contractor and subcontractor requirements:

- ?? Contractors and subcontractors shall be experienced and fully qualified in the design, procurement, installation, test and evaluation, , modernization,

- modification, overhaul, repair, refurbishment and/or demolishing of utility plants, systems, and equipment, including but not necessarily limited to those listed hereinbefore. This shall include complete equipment, system, plant, and facility commissioning.
- ?? All work shall conform to the latest applicable codes and standards of the appropriate governing body (i.e., federal, state, or local authority having jurisdiction) and of the appropriate standards setting organization (e.g., AEE, ASME, ANSI, API, AWWA, IEEE, NEMA, NFPA, ISO, etc.) Contractors must demonstrate familiarity with and ability to apply all applicable codes, specifications, and standards.
 - ?? Contractors shall be fully qualified to work in hazardous locations, such as high pressure containing, high temperature, and high voltage equipment, confined spaces, high stacks and towers, etc., and shall demonstrate an understanding of the applicable codes.
 - ?? Contractors performing utility distribution pipeline work must be California State Fire Marshall Certified hydrostatic pressure tester and must be familiar with all applicable codes and specifications including ASME, API, state, and CFR instructions.
 - ?? Contractors shall be experienced in developing multi-media training and informational presentations, to include preparing CD-based media, and demonstrated capabilities in graphic arts and computer-based publishing.
 - ?? Contractors shall be experienced in conducting problem solving meetings, conferences, and similar sessions – to include developing agenda, facilitating the meetings, and documenting results.

5.2 Labor category attributes:

- ?? Project / Program Manager: A graduate engineer or registered professional engineer, typically with a minimum of ten years of relevant utilities engineering experience and a minimum of five years of relevant energy management experience.
- ?? Senior Project Engineer: A graduate engineer or registered professional engineer, typically with a minimum of ten years of relevant utilities engineering experience and at least five years of relevant working experience with facilities and equipment.
- ?? Senior Engineer: A bachelor degree in engineering, typically with a minimum of five years of relevant utilities engineering experience with similar equipment and facilities.
- ?? Engineer: A bachelors degree or equivalent in the engineering discipline being worked in (electrical, electronic, mechanical, civil, architectural, or structural), typically with a minimum of two years engineering experience and one year of relevant experience with facilities and equipment.
- ?? Junior Engineer: A bachelors degree in engineering.
- ?? Technical Specialist: Typically a minimum of five years of relevant working experience with facilities and equipment.

- ?? Technician: Typically a minimum of three years of relevant experience in mechanical, electrical, or hydraulic systems on facilities equipment and systems.
- ?? Energy Awareness Specialist: Typically ten years relevant technical experience developing energy conservation programs.
- ?? Public Relations Specialist: A bachelors degree in public affairs / public relations, typically with five or more years of relevant experience in managing a public relations program.
- ?? Computer Systems Analyst: A bachelors degree in computer science, typically with five or more years of relevant experience in computer systems analysis.
- ?? Senior Technical Writer/Editor: A bachelors degree or equivalent, typically with five or more years of relevant experience in the preparation and development of technical documentation.
- ?? Specifications Writer: Typically three or more years of relevant experience in preparing, updating, and revising federal and military specifications.
(Comprehensive knowledge of Defense Standardization Manual DOD 4120.3-M, Military Standards MIL-STD-961 and MIL-STD-962 and Federal Property Management Regulation FPMR 101-29 is expected.)
- ?? Drafter: Typically a graduate of an accredited technical school or equivalent with three or more years experience in technical illustrative drawing by both CAD and manual methods.
- ?? Illustrator / Graphics Specialist: Typically a graduate of an accredited technical school or equivalent with three or more years relevant experience in technical illustrating and/or artistic illustration.
- >Senior Technical Typist/Word Processor: Typically 3 or more years experience in processing of complex
and lengthy technical reports which include tables, graphs, charts, or multiple columns.
- >Data Entry Clerk/Clerk-Typist: Typically 1 or more years experience in searching for, interpretation,
selection, or coding of items to be entered from a variety of source documents,
and in performance of routine clerical and typing work.

END SOW